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Journal of the Society of Arts.

FRIDAY, FEBRUARY 11, 1859.

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EXAMINATIONS, 1859.—LOCAL BOARDS.

The following Local Boards have been appointed since the last announcement:—

For Ashbourne.

Rev. W. A. Duckworth.
Rev. J. R. Errington, Vicar of Ashburne, President of the Institution.
Rev. J. L. Errington.
Mr. Francis, 1st Class Certificated Master.
Dr. John Lee.
Rev. T. J. Jones.
Mr. C. J. Welch, Solicitor.
Captain Holland, R.N., *Secretary.*

For Glasgow.

Dr. Thomas Anderson, Professor of Chemistry, Glasgow University.
Mr. Hugh Blackburn, M.A., Professor of Mathematics, Glasgow University.
Mr. James Bryce, M.A., F.G.S., High School, Glasgow.
Rev. James Taylor, D.D., Oakfield House, Hillhead, Glasgow.
Dr. Allen Thomson, Professor of Anatomy, Glasgow University.
Mr. James Young, Sardinia-terrace, Glasgow.
Mr. Charles Wingate, Accountant, Mechanics' Institution, 57, North Hanover-street, Glasgow, *Secretary.*

For Leicester.—Church of England Institute.

Rev. A. Hill.
Rev. W. Hill.
Rev. T. Jones.
Mr. Thomas Ingram.
Mr. Richard Luck.
Rev. W. B. Moore.
Rev. E. T. Vaughan.
Rev. J. O. Picton, *Secretary.*

ENGLISH ART IN FRANCE.

The following letter has been addressed by Mr. John P. Knight, Secretary of the Royal Academy, to M. Théophile Silvestre:—

Royal Academy of Arts, Trafalgar Square,
London, 31st January, 1859.

Sir,—I laid your two letters, the last dated the 24th inst., before the President and Council of the Royal Academy of Arts, at their meeting on Saturday last, and am directed to convey to you the assurance of their high appreciation of the expression of H. E. the French Minister of State, in approbation of the English school of art, and also of the offer on his part to devote a room for the reception of English works of art for exhibition at the Palais de l'Industrie in April next. I have also received instructions to make known this gratifying and generous offer to the president of the different Art Societies in Great Britain.

The President and Council feel that this expression of sympathy for British Art, on the part of the French Government, deserves and demands an earnest response from British artists, as founding a noble emulation and mutual good-will between the artists of the two countries.

I have the honour to be, Sir,
Your obedient servant,
JOHN P. KNIGHT, R.A., Sec.

TENTH ORDINARY MEETING.

Wednesday, Feb. 9, 1859.

The Tenth Ordinary Meeting of the One Hundred and Fifth Session was held on Wednesday, the 9th inst., William Hawes, Esq., Member of the Council, in the chair.

The following candidates were balloted for and duly elected members of the Society:—

Green, Richard Angell
Hixon, John
Laing, Rev. David, M.A.
McKinlay, W. Boyd, M.D.
Peel, George, C.E.
Simkin, Richard
Williams, James

The following Institutions have been taken into Union since the last announcement:—

Gosport and Alverstoke, Literary and Scientific Institution.
Ashbourne, Working Men's Institute.
Widnes Dock (near Warrington), Mechanics' Institution.

The Paper read was—

ON THE UTILIZATION OF WASTE SUBSTANCES.

By Peter Lund Simmonds.

The announced title of the paper I am about to read scarcely expresses accurately the subject I propose to discuss, but it would be difficult to find one which should embrace and define all the matters to be treated of. There are many substances already utilized, which are to all intents and purposes waste or refuse substances; and there are very many others not used, which are also waste substances, and well worthy of the attention of practical men. The subject is highly important in its commercial bearings, whether the substances utilized are limited or extensive, because they all lead to a watchfulness and thriftiness which converts waste matter to some profitable use.

Viewed in its collective form, it has not occupied that prominent degree of attention which it demands; and although I cannot hope to bring forward much that is new, yet the hints and details respecting some of these reconversions and applications of waste materials may lead to thought, and prove profitable in other quarters, while they will probably elicit in the subsequent discussion much interesting information on these and other substances.

When we perceive in nature how nothing is wasted, but that every substance is reconverted, and again made to do duty in a changed and beautified form, we have at least an example to stimulate us in economically applying the waste materials we make, or that lie around us, ready to be utilized.

Some subjects of this kind have already occupied the special attention of the Society, and among others I may allude to those of fish-guano by Mr. Horace Green and Mr. Lawes (*Journal*, Vol. ii., p. 87); the Utilization of the Sewage of Towns, by Mr. Fothergill Cooke (Vol. v., p. 49); "The utilization of the slags or molten mineral products of smelting furnaces," by Dr. W. H. Smith (Vol. iii., p. 335) &c.

In every manufacturing process there is more or less waste of the raw material, which it is the province of others following after the original manufacturer to collect and utilize. This is done now to some extent, more or less, in almost every manufacture, but especially in the principal ones of the country—cotton, wool, silk, leather, and iron. But new industries spring up from time to time, and out of the waste of these, much commercial wealth has yet to be drawn.

In the desultory observations I am about to offer, I shall group the waste substances, for convenience, under the ordinary divisions of Animal, Vegetable, and Mineral.

First then, as to the Animal Products:—

In the woollen manufacture a considerable portion of the raw material is scattered as waste; but there are a number of "waste merchants" in different parts of the country who buy up everything like wool, and send it to Leeds, Dewsbury, and Batley, to be made into shoddy or mungo. Being mixed with some new wool, it is spun into yarn, and made into broadcloth, doeskins, pilot cloths, druggets, and coarse carpeting. The reproduction of a woven fabric from material formerly regarded as entirely waste and useless for such purposes, is a striking illustration of the adaptive ingenuity of the present day.

Besides the woollen rags collected at home, others are imported. These are torn up by machinery, and their fibrous material entirely separated; this is then spun into "low numbers," and made into a coarse description of woollen cloth, used for baize, table-covers, &c.

The rag-grinder takes the cloth, when thrown aside by the wearer, cuts it into particles, which he forcibly tears asunder, and thus re-models them into raw material, to be again used by the first consumer. And of such consequence is this last process to the trade, that the 16 rag machines in the town of Leeds alone are capable, in full work, of producing 3,605,760 lbs. of raw material in a year, or (upon the average of 9lbs. to the fleece,) of adding to the annual stock of wool the fleeces of 400,000 sheep.

A recent visitor to the woollen districts of Yorkshire has discovered that pilot cloth is shoddy; that glossy beavers and silky-looking mohairs are shoddy; that the Petershams so largely exported to the United States are shoddy; that the soft, delicate cloths in which ladies feel so comfortable, and look so graceful, are shoddy; that the "fabric" of Talmas, Raglans, and paletots, and of other garments in which fine gentlemen go to the Derby, or to the Royal Academy Exhibition, or to the evening services in St. Paul's and Westminster Abbey, are shoddy. And if Germany sends us abundance of rags, we send to Germany enormous quantities of shoddy in return. The best quality manufactured at Batley is worth ten shillings a yard; the commonest not more than one shilling.

Even the greasy cotton wads with which engineers wipe their machinery enter into the material of some qualities of shoddy. But there are woollen rags that are not good enough for shoddy, and these are used as manure for the hops in Kent, so we get shoddy in our beer as well as in our broadcloth. Two-and-a-half lbs. of dry woollen rags, we are told, are equal to 100 lbs. of farm-yard manure, or 15 lbs. of liquid blood, when applied to land.

In addition to the rags and tailors' clippings, worsted stockings, carpeting, skirtings, and such like, are pulled to pieces and reworked.

The flocks made at the "rusing gig" from pilot cloth in the wet state, are cleaned and dyed, and used in the manufacture of certain yarns. These flocks are also used for stuffing mattrasses, seamen's bedding, and common articles of furniture. There is still, however, some "mill waste" which cannot be worked up again for shoddy, namely, that portion of the wool waste which is so saturated with oil and grease, that the fatty matter is heavier than the wool. This is called "creash," and forms a very valuable manure.

A process is now in operation at the Kinghole woollen mills, near Dumfries, by which the hitherto refuse water of the washing houses is converted into valuable commercial material. By means of mechanical appliances and chemical action, the refuse formerly turned into the river Nith to the injury of the salmon, is made to produce stearine, which forms the basis of composite candles, as well as a cake manure that sells at 40s. per ton.

Teal's patent for recovering the fat from waste soap liquors is chiefly applicable to wool-scourers' soap-waste, and is conducted in the following manner:—

The fluid, as obtained from the wool-scourers, is run into large tanks, where it is treated with sulphuric acid, which causes the fat to separate from the soap and rise to the surface, carrying with it all the impurities removed from the wool. The semi-solid product, after separation from the water, is, according to Professor Anderson, subjected to pressure in powerful Bramah presses, when the oil or grease is expressed; and a dark brown cake, still containing some oil, along with small quantities of woollen fibre and other impurities, is left.

This refuse substance, which contains about 71 per cent. of organic matter and 3 per cent. of alkaline salts, is sold for manure. Glue-makers' refuse has long been employed as a fertilizer in the vicinity of tan and glue works, and with good success when applied to any kind of crop, as from its putridity it acts rapidly. It is worth about 36s. per ton.

Poake, a name among fellmongers for the collected waste arising in the preparation of skins, which consists of lime, oil, and hair, in various proportions, is also bought for manure.

Wool, ground very fine and dyed, is now extensively used in the manufacture of flock-paper hangings. The wool that comes off the sheep-skins, after soaking in the lime-water of the tan-pits, is sold, when washed, at 3d. to 5d. the pound. We import 2,340 tons of woollen rags annually, valued at £21,658; and flock for paper-stainers to the extent of 1,350 cwts., of the further value of £5,400.

In the carpet manufactories, the waste from the carpet looms is used for stuffing mattresses, &c.; another portion of the waste from the looms and winder-wheels is used for making prussiate of potash, and the general mill-waste for manure.

There are many light articles of ladies' dress, such as balzarines, orleans, coburgs, alpacas, &c., which are formed by an admixture of a warp of cotton with a weft of worsted, or of mohair, alpaca, &c. Now, after these are worn out or thrown aside, they are comparatively valueless, from the mixture of the two substances, but, by a chemical process, the cotton is now destroyed, and the wool, the most valuable substance of the two, is recovered for future use in making woollen cloth. I have here specimens of dresses first, as collected from the dust-hole; secondly, after boiling in acid; thirdly, the recovered wool teazed into Bromley wool, the refuse dust being used as manure; and, finally, cloth made of one-fifth long wool and four-fifths of this Bromley wool.

Cow-hair, from the tanneries, is used for mortar and for making felt; but, in some parts of the continent, they make ropes and carpets of it, and stuff sofas and chair-cushions with it instead of with horsehair.

The waste shavings in whalebone cutting are employed as a stuffing material by upholsterers, and for filling firegrates in summer; and all the refuse goes to the farmer for manure, or to the prussiate maker, to be used with other animal substances, woollen waste, rags, hoofs and horns, button-makers' refuse, bone drillings and filings, to form those beautiful salts.

We import yearly about 21,000 cwts. of raw knubs and husks of silk; the husk which covers the chrysalis, after the best silk is reeled, is used for bed covers, or spun for common silk stuffs. This offal amounts to 10 per cent of the weight of raw silk. The gum has to be discharged from the husks and knubs; these are bleached and the dressed waste cut to a uniform length for carding. It has then to be twisted into skeins, rovings, and cops. The Chinese, not content with using the silk thread of the cocoon, with their usual thriftiness, determining that nothing shall be wasted, eat up the chrysalis itself.

Under the various names of glue pieces, sizing, spetches, and scrows, the offal or parings of skins and hides and the pelt from furriers, the hoofs and ears of horses, cattle, and sheep, are used by the glue makers. Old leather scraps are even converted into glue. Gelatine is a purer kind of glue, also obtained from waste materials, such as the raspings and trimmings of ivory, the bones, cartilage, and tendons of animals. The clippings of parchment, vellum, gloves, leather, and other kinds of skin and membranes yield size. The French buy up largely our written parchments, and after removing the writing, return them to us in the shape of kid gloves. The shavings of seal and other skins are used for filling tennis and cricket balls.

Dog-fish are caught principally for the oil obtained from their livers, a large fish yielding about a barrel of oil. Their dried bodies are sold in Nova Scotia at 2s. 6d. the hundred, for feeding pigs during the winter, from November till May; two fish boiled or roasted are given per day to a good-sized store pig.

Several hundred dog-fish skins are anually imported, principally for smoothing wood and metals by their rough abrading surface. Eel skins are used in America and other quarters for twisting into ropes and whip lashes, and to form the thongs connecting the swiple and hand-staff of the thrashing-flail. Sole skins, and some other fish skins, are sold in large quantities to dealers at 4½d. a ℔, being used to refine liquors, clear coffee, &c.

Porpoise skins are now tanned, and make excellent shoe leather. The walrus hide has also been used for a similar purpose. In Texas, they even tan and prepare alligators' skins, so as to resemble the finest calf-skin in pliability, and they are beautifully mottled, like tortoise shell. Boots have been made of them, and it is certainly something novel to change the skins of these huge ugly reptiles into forms of beauty and usefulness. We hope also to get musk from them some day. In the East and in Africa, they convert snake skins into slippers, and use them as we do shagreen, for giving a firm grip of the hand to the sword hilt. The women of the Orotchys, Tungooses, and Goldians, have the art of tanning or preparing the skin of some species of salmon, so as to be flexible, for the purposes of clothing, and it forms most of their dress.

We have long paid a tax on dogs in this country, but in Paris the imposition is new, and it led to an immense destruction of these quadrupeds in the Seine. A number of persons forthwith engaged in the occupation of getting out the dead bodies, and boiling them down to extract the fat, which is employed in the preparation of kid gloves, and especially of straw coloured ones, being sold at the rate of 2½ francs per kilogramme.

In New York, from 5,000 to 8,000 stray dogs are annually impounded, and those not redeemed are drowned. The carcases are taken to the offal boats, which convey them to Barren Island, where every part of them is turned to some useful account. The fat is melted out; the skins are sold to glovers; and of the bones an excellent compost for fertilising land is made.

Dogs' fat is very much used by the Germans in the United States, the Cape, and other localities, in cases where cod liver oil would be prescribed by our physicians.

Whether the dog is utilized to the same extent here I am not prepared to say, but we see a good many dog-skin gloves ticketed in the outfitters' windows, and as there are more than 400,000 dogs on which duty is paid, exclusive of fully as many thousand more in the country which do not pay the tax, there is scope enough for industry in this respect.

Bones are certainly a waste product, and are largely used for various purposes. Even the shank bones of the giraffe have recently been imported in some quantity from Southern Africa. Ground bones, and dissolved bones, or superphosphate of lime, are in extensive demand as fertilisers, and superphosphate is also manufactured from coprolites. It is the meanest of the bones that are ground up for phosphates, and made fertilizers of the soil. Bones enter largely into commerce for manufacturing purposes, being employed by cutters, turners, and others, for making bone black or animal charcoal. They are converted into handles for tooth-brushes, nail-brushes, knives, fans, combs, small spoons, buttons, and a score of other things. Bones are classed according to their value. Thus, the thigh bones of bullocks are the most valuable. The jaw-bones come next, and the short bones, the refuse of the family table, are of the least importance.

Bones are boiled to obtain the gelatine and for the size used by dyers and finishers of fustians, velveteens, &c., and to obtain the fat, which is white from fresh butchers' bones, and brown from imported and old collected bones. The colour is improved by this boiling. The bone waste, dust and refuse is extensively used for manure.

We imported about 64,000 tons of bones in 1857, valued at £397,000; and it is estimated that 70,000 tons are collected at home, worth about £435,000 more.

Mr. Geo. Torr, one of the largest manufacturers of animal charcoal, &c., in the metropolis, could supply much valuable information on this head.

How seldom is any attempt made to save the blood when animals are slaughtered on the farm or by village butchers; in large cities and towns blood is very generally collected and sold to refiners of sugar and other classes of manufacturers. It is made into animal charcoal and albumen. Coagulated, it is sold to calico printers for dyeing Turkey red, and in some of the agricultural districts it is esteemed as a fertiliser.

Some people use the blood of cattle largely as food, mixed with meal of one kind or another. When intended for this purpose it is stirred briskly as it flows from the veins, whereby its coagulation is prevented, and it is then stirred into the meal, and boiled or cooked in any other way. The coagulating property of blood renders it of considerable use in clarifying thick mucilaginous liquors. Mr. T. Dixon, one of our members, has supplied me with specimens of the of the residue after being used in refining sugar, which is sold as manure.

Cider is sometimes fined by this method, being simply beat up cold with the blood and put into a barrel. On standing a day, the entire coagulation of the blood, with the impurities of the cider, are found lying at the bottom, in a tough cake, and the liquor above is quite transparent and nearly colourless.

Bile, the bitter principle secreted by the liver, has been occasionally employed with advantage in medicine, when dissolved in alcohol or inspissated. But its chief use out of the body is as a detergent to scour wool and cloth, remove grease-spots, &c. Ox-gall is chiefly applied to this purpose. It here seems to act as a kind of soap, but with superior powers as a detergent than the mere quantity of alkali in it would indicate.

The same property of mixing with and dissolving oily matters renders bile useful to painters in various ways. When refined it is used by artists to fix chalk and pencil drawings before tinting them. Ivory, when rubbed with ox-gall, loses its greasy gloss, and is thereby much fitter to receive colours, and the gall itself is used to mix greens, bistre, and some colours where the greenish yellow of the gall is not perceived.

The very pretty and durable ornaments now made from fish-scales, by Mr. S. Mahood, are a new and attractive application of a waste substance; fish-scale tiaras, brooches, bracelets, &c., are well known, and to be met with in the galleries of the Crystal Palace, the bazaars, and other places. Fishes' eyes are also utilized by the manufacturer of shell flowers for making the undeveloped buds.

The natives of the north-west coast of America make from the entrails of fishes, bracelets, fishing lines, thread, work-bags, head-dresses, and needle-cases; of the bones they also form fish-hooks and needles. But our more civilised brethren on the other side of the Atlantic have turned fish-bones to another purpose; they boil, cleanse, and shred them, and pass them off as isinglass, with scarcely a particle of the gelatinous property. I am surprised to find this rubbish now filling the windows of dealers who claim to be respectable, as I called attention to this substance some years ago in this room, after Mr. Archer's paper.

When we get valuable dyes from cochineal, lac, and kermes, when we can obtain formic acid from ants, and raise blisters by cantharides, there is no reason why we should not attempt to utilise other insects. In a recent number of an Australian paper I find the following paragraph. Whether it be in joke or earnest I cannot say, but if the discovery be a fact, I should, by all means, recommend the collection of the raw material in this great metropolis:—

"A late arrival in Melbourne is engaged in rather a novel occupation, being no other than extracting a dye from those nocturnal depredators unfortunately remarkably prevalent in this colony—bugs! We have seen the dye, which very much resembles that which is extracted from the cochineal insect. Our spirited "new chum" has a wide and luxuriant field for his peculiar operations in Australia, and will richly deserve the thanks of every man, woman, and child in the community, if he vigorously pursues his manufacture till he has utterly exhausted the raw material. Who knows but this happy idea of making the insects "dye" may in a few years render a bug as rare a curiosity in an Australian museum as a tinder-box, flint, and steel."—*Melbourne Argus.*

The paunches and butchers' offal, liver, boiled horse-flesh, &c., are sold as food for dogs and cats. Wholesale horse-flesh costs the dealers 1⅝d. to 2d. per pound; we cannot, therefore, wonder that the cat's-meat vendors dole out rather small halfpenny-worths to the owners of Grimalkins, as they have their profit to turn. The commercial products of the horse and other dead carcases, the useful applications of excrementitious and other waste substances, I have described fully in the catalogue of the animal products of the South Kensington Museum; as these are very generally known to the public, and the subject is not inviting for discussion before a general audience, I need not enlarge upon them here.

Neats-foot oil and trotter oil are products obtained in the process of boiling down calf's-feet and sheep's-feet; the former is used for softening leather and other purposes, the latter principally as a hair-oil.

Bladders of oxen, pigs, calves, and sheep are prepared for holding lard, tying down bottles and jars, &c. Quantities are imported from North America and the continent, packed in salt or pickle. Some of the gut forms cases for Bologna sausages, polonies, black puddings, preserved meats, &c., and they constitute the material of that very important substance—gold-beater's skin, the manufacture and use of which are valuable trades in London. Under the misnomer of catgut and catlings, there is a very important application of a waste material in the manufacture of the dried twisted intestines of sheep, for the strings of musical instruments. These are imported to the value of £2,300 a year.

All excrementitious deposits of animals are valuable as fertilizers for land, but those of the domesticated animals are of course most largely available.

Attention has frequently been directed to the substances wasted in the fisheries and returned to the sea as garbage, and to the detriment of the fisheries. The difficulty has hitherto been the collection and bringing together the refuse to one or more conveniently-situated manufactory. The preparation of fish guano, that is to say the transformation of the carcases and offal of fish into a manure adapted for restoring to cultivated soils their fertility, is a branch of industry which, I think, will in due time assume a remarkable extension.

The utilization of the waste products of the fisheries has often been discussed here, and its importance acknowledged, and yet comparatively little progress has yet been made in carrying out the subject on an extensive scale.

It is confessedly an object of the first importance to find an auxiliary or substitute for guano, which may check the excessive prices that now limit the consumption, and which shall afford a provision of artificial manure, when the supply of guano shall fail. Fish, the source of guano, naturally suggests itself. The supply is inexhaustible and almost unlimited. Reduced to its solid parts, it is a valuable concentrated manure, rich in the best fertilizers, ammonia and phosphates, while the gelatine and oil may be collected as merchantable products, which will generally pay the cost of converting the fish into manure, and perhaps leave a profit.

It has been ascertained, by multiplied and satisfactory experiments, and confirmed by actual working, that the waste and refuse fish may be thus converted, and the gelatine and oil collected. A new company has recently been formed to manufacture fish guano, and a patent is likewise secured for combining in a cheap and portable form all the nutritive portions of fish, and they are well adapted to support, efficiently and permanently, mental and physical vigour; it is easily preserved, in all climates, seasons, and circumstances, in a form the most concentrated and adapted for carriage; it is prepared with little trouble, and by its cheapness accommodated to universal use. The machinery and the process are most simple, inexpensive, and effectual. The resulting manure is a dry fibrous powder, which retains all the fertilizing powers of fish in a form most convenient for transit and distribution, whilst its appearance and sensible properties make adulteration palpable, since every one can judge for himself (by the mere inspection and smell), of its genuine character. The demand would certainly far exceed the utmost attainable supply, and, at a price moderate as compared with any other manure, it would give a very large profit to the manufacturer. The waste and refuse of a great fishing port will supply the materials cheaply and without much outlay, and as it will be a great gain to a fishing adventure to obtain a certain and constant demand for all this waste and otherwise unsaleable fish, the establishment of manufactories for fish manure will lead to new fisheries where, without such aid, they could not prudently be commenced.

Yarmouth, the chief fishing station in England, with the adjoining coast from Lowestoft to Aldborough, offers every advantage for such a manufacture. It employs nearly 400 boats, from 25 to 60 tons each. They ordinarily afford from 2,000 to 3,000 tons of broken fish and salt, selling at about £1 2s. per ton, besides the waste of 400 smoking-houses, sold as refuse; and from 500 to 700 tons of herring scales, a substance containing 16 per cent. of nitrogen and a very large proportion of phosphates, and obtainable for £1 10s. per ton. This is independent of the waste from occasional gluts of dog fish and others useless for food, of which no account is taken, yet which are caught in very large quantity, and of which an unlimited supply might be obtained if the fishers could obtain a sale. Last year, so great was the glut of herrings at Lowestoft, that, at one time, they were carted by the farmers at 4s. 6d. per ton.

An ample, cheap, and continuous supply would therefore be secured from the first, by simply taking from the fishermen what they will only be too thankful to sell; and the manufacture, which would be in every sense of the word a national benefit, may be carried on with no risk, small outlay, and large profit.

It would be a curious investigation to follow out the value of the street sweepings, scavengers' collections, ashes, &c., obtained in this metropolis and other large towns, but the subject would carry me too much into detail, and I have not the figures as to the large sums paid to different districts for the contract or privilege of carting away the waste.

The corporation of Antwerp, which used to pay £1000 a year to get rid of the refuse of their city, now receive upwards of £40,000 a year for the sweepings of the streets and the contents of the cesspools, contractors converting the nuisance into powerful guano. At Paris and Milan town guano is manufactured, which has extraordinary powers as a fertiliser.

The street pickers and sewer rakers, and the persons who frequent the river banks, &c., gather up rags, bones, metal, old boots and shoes,—in fact, anything that can be sold or reconverted to a useful purpose.

The boots and shoes go to the translators, vampers, and clobberers, as they are technically termed in Monmouth-street and the purlieus of Petticoat-lane and Rag Fair, where, by the use of the heel-ball and clobber, a mixture of ground cinders and paste, the crevices and breaks of our old "understandings" are filled up; and, when the cement is dry and a few nails and stitches are added, they are polished and disposed of to those who patronize or can only afford cheap shoe-leather.

Vegetable Substances.

There are some again who buy only the clippings of tailors, shirt and cap makers, and others engaged in the manufacture of dress. These gatherings are either sold to the piece brokers, or to the shoddy maker.

The itinerant clothesmen of the metropolis are pretty numerous, although I have no precise account of their numbers. In conjunction with the china and glass pedlars, and the vendors of growing plants and flowers, they collect worn-out garments, hats, boots and shoes, &c., which are renovated and made "better than new," for home sale, either in Holywell-street, the Minories, and the neighbourhood of the Tower, or in Monmouth-street, and such localities. Then there are the wardrobe purchasers, whose advertisements are seen continually in the *Times*, requiring garments for export. These classes furnish a considerable portion of the "apparel and slops," to the value of £2,000,000 sterling, annually exported, half of which goes to Australia.

The extent of this waste material trade, if I may so term it, may be estimated by the number of persons engaged in it in London, as gleaned from the pages of the Post-office Directory. This number, however, is necessarily far below the mark, as it only includes housekeepers, and many in the suburbs are omitted. There are, I find, 354 clothes salesmen; (these, perhaps, are not all vendors of *old* clothes, but include some of the outfitters,) an undefined number of wardrobe dealers, 160 rag merchants, 564 marine store dealers, 19 bone dealers (10 of whom are bone boilers), and 3 bone crushers.

Rags are the common emblem of poverty, and to say that a man is in a ragged condition is the worst thing that can be said of him; but rags are in fact a great source of wealth, and one of the staples of our commerce, for, besides our large home collection, we import cotton and linen rags, on the average of years, of the value of more than a quarter of a million sterling; and the whole quantity used in the kingdom is estimated to exceed one million sterling. During the late war there was an enormous demand for linen rags by the apothecaries to scrape into lint. Unless persons then have carefully examined the vast amount of the cost of rags, they can form no idea of their great importance. To make one pound of paper it takes one and a quarter pounds of rags.

Our imports of rags and other materials for making paper, in the last few years, have been as follows:—

Years.	Quantity. Tons.	Value. £
1854	11,415	255,910
1855	9,414	219,323
1856	10,284	230,116
1857	12,196	272,848

The largest quantities come from Prussia, the Hanse Towns, Russia, and Italy.

In New York there are more than 1,000 professional rag pickers, 100 wholesale rag dealers, besides 700 licensed and unlicensed junk shops, which buy rags from housekeepers and rag pickers, and sell them to the rag dealers.

It is a well-known fact that the supply of rags has been for many years very short, and every device that human ingenuity could invent has been resorted to to supply the deficiency. In place of rags the waste from palm-leaf manufactories, grass, bass wood, cane-trash, wood-shavings, birch bark, and a hundred others, have been tried in different quarters, out of many of which paper of a fair quality for wrapping purposes has been produced, but I am not aware that any of the finer qualities of paper have been manufactured from these articles.

There is a substance which is largely produced in the sugar-growing countries, the megass or trash, the fibrous portion of the stalk of the sugar-cane left when the juice is expressed. This is chiefly used, after being dried, as fuel for heating the boilers in which the sugar is made, although it ought properly to be returned to the soil as manure. It has been suggested that this would furnish a valuable paper pulp, being easily reduced, if the cost of the chemicals for bleaching it were not found too great. The remaining juice (for it is seldom sufficiently pressed in the mills) should be washed out, and the inner white fibre, rejecting the rind, soaked in a solution of carbonate of soda or potash. It is unknown how much sugar, convertible at least into rum, is burnt every year under the coppers on the sugar estates of our colonies. If this saccharine could be saved, and the larger portion of the megass converted into a cheap material for the paper-maker, a profit would be made, even after defraying the cost of other fuel, to supply the place of the abstracted megass.

Not only would the finding of a plentiful and good substitute for rags be of great importance in a pecuniary point of view, but it might be the means of preventing the spread of malignant diseases. Many a case of small-pox, yellow fever, plague, and cholera, are to be traced to the filthy rags carried from place to place.

The lowest price of common rags is £15 per ton, to which is to be added the loss of one-third before such rags are reduced into "half-stuff." Good linen rags are worth £28 to £30 per ton. One of our largest and best paper-makers has declared that "it is nonsense to talk of paper made solely from linen rags; linen rags," he says, "cannot be found, nor, indeed, any other rags in sufficient quantity to supply an increased demand; and that unless a new material be found, paper making will be at a stand-still."

Mr. F. B. Houghton has recently patented a process for making paper from any description of woody fibre, which is especially applicable to the manufacture of paper from flax-straw, or flax refuse. Flax-straw (shoves) can be procured at 50s. a ton, about 2½ tons making one ton of paper. Waste flax (the refuse of the scutching mills, from which no profitable results are obtained) can be procured at a mere nominal price, as it is burnt or thrown away. Now, as our imports of rough or undressed flax amount to 81,000 tons a-year, and our home growth of flax is extensive, there being 100,000 acres under culture in Ireland, there is plenty of raw material available.

Wheat straw, we know, affords a good pulp for paper, strawpaper, both for writing and printing, being now extensively used in France, in England, and the United States; but rice straw, which is plentiful in certain districts, would, I think, give a better pulp, as it is a tougher substance. It has often been said that there is nothing new under the sun, and that straw paper, to which attention is now so prominently pointed, was known and worked sixty years ago. I hold in my hand a curious book, the second edition of which was published in London, in 1801, entitled an "Historical account of the substances which have been used to describe events and to convey ideas from the earliest date to the invention of paper;" by Matthias Koops, Esq. It is printed, for the most part, on paper re-made from old printed and written paper. Part of the work is printed on straw paper and some on wood. The work is dedicated to George III. An Act of Parliament was passed in favour of the author's manufacture of straw paper, and he appears also to have taken out patents for making paper from hay, thistles, waste, and refuse hemp and flax, and different kinds of wood and bark, fit for printing and almost all other purposes for which paper is used. Then I have here two other applications of waste materials, a descriptive account of the cow-tree, by Mr. J. Murray, printed on paper made from the *Musa textilis;* and an illustration to which, is printed with ink obtained from the fossil sepia, contemporaneous with the *Ichthyosaurus!* While another pamphlet, by the same author, giving an account of Newzealand flax, is printed on paper made from its leaves, bleached. Both these were published in London in 1838.

In the words of a correspondent of the *Journal* five years ago, I may add that, with the immense resources which this country possesses in her tropical dependencies, more especially India, she should have the supply of the world with paper as she has of other manufactures, instead of being undersold; but new ground must be opened.

There are in the United States over 800 paper mills in operation, requiring about 3,000 engines to keep them at work, and they produce upwards of 270 millions of pounds of paper.

To show how important an article of consumption rags are, I append a statement of the cost of manufacturing this immense amount of paper:—

406,000,000 lbs. of rags, at 2d. per lb....	£3,383,333
Cost of labour at 1d. per lb.	1,691,666
Cost of conducting the manufacture......	810,000
	£5,884,999

In 1853, the import of rags into the United States amounted to 9,486 tons, valued at about £183,130. The principal portion of these was imported from Italy. Besides this large amount of raw material, the Americans import yearly about £200,000 worth of fine paper.

Although the quantity of paper used by different European countries in proportion to the number of their inhabitants is not to be compared with the amount consumed in North America, yet it is considerable, as the following figures will show:—

	Population.	Paper.
United States	25,000,000.........	112,500 tons
Great Britain	28.000,000.........	85,000 ,,
France	35,300,000.........	70,000 ,,

The consumption of paper is now large for papier maché articles, frames, and mouldings, &c., which are formed either of plain grey wrapping paper, pasted together in successive layers of the required thickness, paper-makers' pulp, or coarse paper cuttings, boiled and macerated to a paste, and then thickened and rendered adhesive by gum or by glue. Bookbinding and paper-hanging, which increase with the progress of wealth, population, and civilization, also make increased demands for paper, exclusive of the large consumption for printing, packing, carton pierre, and paste-board boxes, &c.

Cotton waste is the refuse cotton of the mill, being the "strippings" from the card, after the cotton has passed through the machine, the "flyings" or the portions which fly off from the card whilst the machine is in motion, the "droppings" and "blowings" which collect under the blowing machine in which cotton is cleaned, and the "sweepings" or gatherings from the floor of the card room.

The value of cotton waste varies with the price of cotton; strippings and blowings are worth about one-half to two-thirds that of cotton; and droppings, blowings, and sweepings, one-tenth to one-eighth.

The waste of cotton made during the process of manufacture, is, according to Mr. Ashworth, wrought into coarse sheets and bed-covers, which are sold at prices varying from 6d. to 9d. per lb. The residue of the waste is used for the manufacture of paper, the cleaner portion being for writing-paper; and the sweepings from the floors of factories supply a large proportion of the paper-mills of Lancashire with the raw material of the paper which is used for the printing of books and newspapers. The actual quantity of waste made must be very considerable upon a consumption of 800 or 900 million pounds of cotton annually.

Estimating it at 15 per cent., the usual allowance, there is at least 50,000 tons of cotton waste available, which, added to 20,000 tons of linen waste, and the same amount from rope and canvass, gives a large quantity to be worked up again. Previous to 1841 cotton waste was only used for making very common papers, but straw pulp being more generally used now for this purpose, cotton waste is chiefly worked up for printing-paper.

There are in Oldham 127 cotton waste dealers; in Manchester 82; and in other towns in Lancashire 244; so that there are probably 500 cotton waste dealers in the district. In America waste cotton is employed for the manufacture of articles of furniture, after the manner of papier mache; it is compressed into wood that takes a very beautiful polish.

The quantity of oakum sold in Liverpool, we are told amounts to 1400 tons a year, valued at £28,000, and the quantity used in London no doubt exceeds this, looking at the extent of shipping and the other uses to which it is applied.

Of codilla, or tow, the refuse or waste fibres knocked out of hemp and flax in cleansing and carding it, we imported in 1857 nearly 13,000 tons, valued at £373,000. It is made into bags, sheeting and yarn, and used for other purposes.

By machinery in the United States and on the Continent, the cotton surrounding the seed is taken off, and can be sold to carpet manufacturers and paper-makers. At Antwerp, it realises about 12s. 6d. to £1 the cwt. Recently, in speaking after Mr. Wray's paper on American cotton cultivation (see *Journal*, vol. vii., p. 86), I pointed out in detail the enlarged and very important uses of the cotton seed, formerly a waste substance, and the valuable commercial products now obtained from it, and I need not, therefore, enter again into the details, but I may exhibit a specimen of refined cotton seed oil, now coming extensively into use to mix with rape oil for burning, and to adulterate olive oil.

Waste paper clippings and cuttings are bought up at from 1s. 6d. to 7s. 6d. per cwt. for common, up to 21s. per cwt. for the best clean white, such as the trimmings of bookbinders, envelope-makers' cuttings, the shredding from the plough-knife in cutting post and foolscap, &c. The best is worked up again for white paper, and the more common and coloured kinds for packing-paper and paper-hangings.

The twitch or couch grass, which has hitherto been such a troublesome weed to the farmer in clearing his land, is now turned to several useful purposes. In Italy it is used as food for horses and cattle. Colonel Maceroni, in his memoirs states that upwards of £40,000 sterling worth of this root is annually sold by the peasants to the inhabitants of the city of Naples. In France it has a medicinal repute under the name of dogs' tooth. It has been tried as a material for paper, and is collected in large quantities in the fen districts, and sold to the paper-makers at about 12s. a ton, instead of being dried and burnt as heretofore.

Thus we perceive that the sweepings of our cotton and flax-mills, the outside wrappers of the cotton bales, however discoloured or dirty, the weeds of our fields, thistles and couch grass, the stalks of reeds and canes, sawdust and pine-shavings, the refuse of the Irish flax scutching mills, moss and furze, our cast-off garments, the beggars rags, old sacks, and worn-out ropes, all of which we should be troubled to dispose of, are converted by the paper-maker into an article indispensable to civilized man.

The dry residue of the beet root, after expressing the juice for sugar, consists chiefly of fibre and mucilage, and amounts to about one-fourth of the weight of the clean roots used. It is greedily purchased by the farmers on the Continent, with the skimmings of the boilers, which are found to be a powerful manure. It is also useful as food for cattle.

Mixed with other substances it makes very good paper.

In France pasteboard is also made from the pulp. This fabrication is carried on to some extent in the commune of Fontaine (Haute Marne), and can be employed, it is said, with advantage in ornaments, tea trays, and other such articles.

As the beet-root sugar now made on the Continent amounts to about 200,000 tons, the quantity of residue must be considerable. The residue, too, of the molasses after distillation for alcohol can be converted into excellent potash, the proportion obtained being about one-sixth of the quantity of sugar extracted from the beet.

Tan pit refuse, or the desiccated ligneous matters of the bark and valonia used in tanning, has been converted into charcoal with some success. Tan or spent bark has also its use in hot houses or bark stoves for forcing plants, and the spent dyewoods are converted into charcoal.

There are a variety of what are termed silk cottons, which have hitherto been comparatively waste substances. Some of these are now, I think, likely to be commercially utilised, for there has been inquiry for them in the manufacturing districts.

Among others, I may particularise the vegetable silk (*Chorisa speciosa*), from Bengal, which has long been used for stuffing cushions, and a kind of wild cotton down, with a fine glossy fibre, like silk, which grows abundantly in the valley of the Amazon, and is used at Guayaquil and other localities to fill mattresses and cushions.

Silk-cottons are obtained from *Bombax*, *Calotropis*, *Cryptostegiæ*, &c., in different districts in India. These are not marketable, though silky, and can be worked up with the real cottons. There is something similar to the above obtained apparently from a grass, native name "jummoodoody," only fit for paper-making.

The seed vessel of the *Calotropis gigantea* produces a silky kind of cotton, which has been made into cloth in India.

The cottony seeds of the *Bombax pentandrum* are used in the East as soporific pillows, like those famous poppy ones of Somnus, or as the hop is often prescribed here. The silk down, moreover, forms an excellent moxa.

Under the name of kabu-kabu, this silk cotton down is used for stuffing beds, pillows, &c., in Sumatra. The *Bombax malabarensis* furnishes a similar downy fibre, known as moc-main.

The bombax tree cotton-down is used in the Deccan as a stuffing material, and the tiny humming birds use it to line their nests. It has been shipped from the Deccan to the United States for hat-making.

The cotton of some species of the *Eriocephalus* of Africa appears to have much tenacity, though probably open to the objection of being too short in the staple, and of growing in too minute quantities. The cotton does not grow in the capsule, but between the corolla and calyx of the flower. Each plant bears freely, and plants may be raised from seeds or cuttings.

The pods of *Eriodendron samauna* and the *E. anfractuosum* (Dec.), furnish a silky down in Brazil, which is used for stuffing cushions.

A species of *Asclepias*, resembling a wild asparagus, which grows in the greatest abundance over almost the entire country in Canada, furnishes a fine silky down in its pods, which has been applied with success to the manufacture of hats in the province, being worked similar to hare and rabbit down. It is sometimes mixed with a fourth part of wool. Were it to engage the attention of the manufacturers of textile fabrics, it might be employed for a profitable purpose.

Few of these silk cottons could be made into a strong textile fabric, as they are destitute of all felting properties, but they would undoubtedly fulfil all the requirements of the paper-maker.

The importance to which the article of coir, the fibrous husk of the cocoa-nut, has risen of late years, is a proof of what an extensive trade may spring up out of a waste substance. It is now imported to an immense extent, in the form of rope, yarn, junk, fibre, &c., and is largely used for cocoa-nut matting.

We imported in 1857 cocoa-nut fibre of different kinds, from the husk of the cocoa-nut, weighing 75,510 cwts., and valued at £102,000.

Other useful products than the grain and its leafy covering have been obtained from the maize. Sugar and molasses have been procured from the stalk. The grain is largely used for distillation. A bushel of corn gives over a pint of oil, which is easily purified, and burns with a clear bright flame. A distillery has been established in the vicinity of Lake Ontario, where oil is extracted at the rate of 16 gallons from 100 bushels of Indian corn, leaving the remaining portion of the corn more valuable, and in better condition for distillation than before the oil was extracted. The cob is given as food to live stock, and has also been ground to make a kind of bread.

The husk of the Indian corn or maize is used for packing oranges and cigars, and for stuffing mattresses in America. Paper is also made there from the husks of the Indian corn. As the annual crop harvested exceeds 600,000,000 bushels, there ought to be plenty of raw material from this substance. Most of the American printing paper is made of cotton, on account of the extensive use of that article, and hence it is soft, easily torn, and perishable. The husk of the maize is a very fair substitute for horse-hair, possessing considerable elasticity, and may be had in any quantity, and at a comparatively small price.

The kittool palm fibre, the piassaba, the Mexican grass, the Esparto, and other substances, formerly waste or little known, have also become extensive articles of commerce.

Under the commercial name of Spanish moss, the long horse-hair like fibres obtained about the Missisipi from an epiphyte (*Tillandsia usneoides*), are largely used in America in upholstery purposes, for stuffing cushions, mattresses, &c., possessing considerable elasticity. Naturalists also use it for stuffing birds.

Another fibrous material, introduced as a substitute for animal hair for mattresses and upholsterers' work, is the Esparto grass curled and dyed.

Dr. Terry, of Detroit, in America, has made paper from a so-called moss; and this manufacture has attracted considerable attention in Texas, for there is a region of country there extending one hundred miles from the coast, where an immense quantity of this article can be obtained. The gathering and drying of it requires little or no capital in preparing it for market, and I doubt not, if this business is extensively carried out, that large quanties of the finer quality, instead of being converted into paper, will find their way into the hands of the mattress-makers.

The manufacture of bagging for cotton from moss was not long since tested in Missisippi, and appeared to be of a useful and durable character. The moss was obtained in inexhaustible quantities in the woods, at about 1½d. a pound for the collection, and as 2½d. more amply covers the cost of manufacture, the article could be furnished at about 4d. a yard. The demand for wrapping-cloths for the 3,000,000 or more bales grown in the United States is consequently extensive, and the coarse gunny bags, made of jute and sunn fibre in India, are largely imported. These gunny bags, and old rope or junk, are, after use, ultimately worked up into paper. I have here specimens.

The chippings and pieces of the cork-cutter are now extensively used for laying on the floorings of suspension bridges, embedded in asphalte or some composition. The foot-ways and carriage-ways of the new Chelsea bridge were so formed.

The palm oil of commerce, which is now imported to the extent of 42,735 tons a year, is entirely made from the sarcocarp or the fibrous pellicle that surrounds the nut; and the kernels, with the exception of an insignificant quantity used for the manufacture of oil for domestic uses in Africa, were formerly thrown away. Within the last few years, however, they have been utilized, and the shell being broken, the kernels are shipped to be pressed for oil, and a vast extension of the African trade will arise out of this new article of export.

Mr. C. Heddle, the leading merchant of Sierra Leone, a reliable authority, furnishes some useful data as to this new export. The 50,000 tons of palm oil shipped from Western Africa should give, he estimates, 10,000,000 bushels of kernels, equal to 223,000 tons. The average yield of oil from these kernels being 30 per cent., the 223,000 tons would consequently furnish 76,000 tons of oil, worth at the present price of cocoa-nut oil, which it closely resembles in all its properties, nearly £3,000,000. If we add to this the value of the cake, 112,000 tons, at the very low price of £5 per ton, we should obtain £560,000, making the whole gross value upwards of £3,500,000, or half a million above all the tallow imported into this country.

The waste liquors of soap and stearine candleworks are now converted into that valuable substance glycerine. Oleic acid also takes the place of olive oil in preparing wool, and their other residuums are applicable to various purposes.

The cake or marc of the olive remaining after the oil is expressed, is used in Sardinia, Italy, and other districts for manure and for cattle food. The poonac or refuse pulp, after pressing cocoa-nut oil, is also a valuable fertiliser.

The walnut is the olive of Savoy and the Bernese Alps, supplying the inhabitants with oil not only for home consumption, but for export to France and Geneva. The kernels are crushed by a mill into a paste, which is pressed to extract the oil, and afterwards dried in cakes, called *pain amer*, which are eaten by children and poor people.

About 1,200,000 pounds of walnut kernels are annually consigned to the oil-press in Cashmere, yielding about half their weight in oil, and the other half in cake, which is much valued as food for cows in winter, when it is usually exchanged for its weight of rough rice.

The various oil-cakes which are prepared here, or imported from abroad, are a utilization of waste substances of a very important character. They enter into commerce for feeding cattle and for manure. Of these rape, linseed, and cotton-seed cake are the principal, but all the marc or cake from the oil mills, whatever seed is crushed, is useful to some extent. Our imports of oil-cake have largely increased, reaching now 100,000 tons a year!

It appears that there is an article manufactured in the neighbourhood of Liverpool, called shude, of the value of £3 per ton, and supplied to many oil crushers to mix with linseed cake, to the extent of thirty per cent. and upwards. It is made from the husks of rice and the refuse of rice mills. It is perfectly tasteless, and yields no nourishment. Its colour and price make it a favourite article, and in great demand with dishonest crushers to mix with cake. One grinder of shude has sold to oil crushers during the last nine months nearly 2,000 tons.

The charred husks of the grape and residue of the wine press, are used for making blacks, or the choice ink used in copper-plate printing.

Rape, or the refuse raisin stalks and skins left after making British wines, are used by vinegar makers, the vinegar being filtered through the mass in large wooden vessels.

In cleaning paddy or rice, the rough silicious outer covering, which is impervious to water, forms a useful litter material for stables, and for packing crockeryware or ice, instead of sawdust. There is also separated in the process of husking a bran or fibre, covering the white rice, which is a most excellent food for horses, milch cows, pigs and poultry. The uses of chaff I need not allude to.

The bran or exterior husk of wheat in the process of grinding and bolting for flour, besides its nutritious properties for feeding, has commercial uses in tanning, in calico printing, for stuffing dolls, filling cushions, &c.

I cannot exactly trace the destination of the waste bread from the bakers, and that bought at the rag and other shops from the beggars, servants, &c. Professedly it goes to the waste tub for fattening pigs. Bread raspings from French rolls and overbaked loaves are used for covering hams, and occasionally as a poor substitute for coffee among the lower classes. But I have at least more detailed information as to the application of the waste bread of the French capital.

There is a man in Paris named Chapellier, who has made a noble fortune out of the collection and disposal of waste substances. He commenced as a *ravageur*, that is, a gutter-raker, who searches for horse-shoe nails, pieces of copper, brass, or other substances, which he sells to the dealers in those articles. Then he became a *trilleur*, in the service of a wholesale *chiffonier* of the Montagne Saint Geneviève, his duty being to sort the contents of the chiffoniers' baskets, and arrange them in the warehouse until they can be sold. In the course of this occupation he was struck with the pieces of bread they brought in and could not sell. It occurred to him that these could be utilized and turned to profit, and he set up in business on his own account. He made bargains with the chiffoniers, the scullions of the restaurants, and the cooks of all the schools, colleges, and convents, and he established himself in the very centre of the Halles as a vendor of bread crusts. These were largely in demand for feeding rabbits, poultry, dogs, &c., and in four months after his first appearance at the foot of the Fountain of the Innocents, he had three horses and three waggons continually busy collecting bread crusts.

In a few years he retired upon what he considered fortune enough, but, after the first month, he found himself more miserable than he had ever been in his life before, and was fain to return to his old haunt on Mount St. Hilaire. He now struck out a new line of business. He noticed that the cooks, butchers, pork-sellers, those who fry fish, and others, used a great deal of bread-crumbs for cutlets, *gratin*, &c. These made from stale bread, pounded or grated, were sold at 8 sous the quart. He manufactured wholesale, and sold at half this price, and soon drew nearly the whole of the trade to himself. He again returned to his old business, buying out his successor. Noticing in the waste bread he received that there were two sorts, the good and the bad, he thought of separating them, but found the profit would not compensate the trouble. He determined to invent a new industry. He made *croutes au pot*.

The stranger who goes to Paris should never order *soupe au pain* or *purée au crouton*, except at the Trois Frères, the Café de Paris, or some such establishment. All comes from the fabrique of Chapellier, from the chiffonier's basket, the college scrap-basket, the convent slop-tub. He has established, near the Barrier St. Jaques, ovens which never cool, and from which thousands of pounds of bread are daily poured forth, to be sold as crumbs or crusts. A large number of men, women, and children are busy piling and grating the merchandise, as it comes out of the oven. The carbonised pieces and scrapings are pounded, sifted through silk sieves, and sold to the perfumers to make tooth-powder.

Nothing is more curious than the warehouses of Le

Père Chapellier. They are immense buildings, where mountains of bread are received every minute. Workmen separate these pieces; on the right are those redestined for man; on the left those intended for rabbits. Wonderful order and cleanliness are everywhere visible. Young girls make up packages of *croutes au pot*, after weighing them. Children fill large boxes with the black powder. The master himself is always present among his workmen, scolding, giving orders, laughing, joking. He is a man of genius, and his annual income may be reckoned by tens of thousands of francs.

Under the names of "brick tea" and "sealed tea," a large commerce is carried on in Asia, in a strange article consisting of a compost of the spoiled leaves and stalks of the tea plant, with the leaves of some wild plants, and bullocks' or sheep's blood, dried in the oven. Each brick or package weighs about three pounds, and it is so firmly pressed together that nothing less than a hammer or chisel will separate it.

In Irkutsk, where an imitation of it has been attempted, elm leaves, sloe leaves, and some others have been substituted with success for those of the wild plants of China. When it is prepared or infused, it yields a thick, deep, red-coloured fluid, bitter and disagreeable to the taste. On the surface of the fluid floats a viscous fatty substance, which the Chinese declare not to be unwholesome, and to be used in order to make the tea stick firmly together in the package.

The leaves of this tea are old, and tough as leather, the mixture of twigs and stalks being also considerable.

The commonest kind of brick tea is sewed up in sheepskin, the more friable masses are packed in paper and sealed. The Tartars and Thibetans make a soup of it, with rye meal, milk, mutton fat, and salt.

"Lie tea" is made from the sweepings of the Chinese tea packing-houses, consisting of the broken leaves of all the various teas, damaged and spurious, dust and dirt, cemented together with rice water, or the serum of the blood of animals, and rolled into grains.

Another variety, from the same source, called "little tea," "tea endings," "tea bones," anomalistic in name as well as quality, is shipped to different quarters, for the purpose of adulterating wholesome and good teas. This is the sweepings of the "hongs," consisting of the dust of green and black teas passed through sieves to make it uniform in size. There are millions of pounds of damaged teas, musty, decayed, and those that were once infused, sent to the United States, and this lie tea has been shipped to our ports here, but met with no success.

The recovery of starch from rotten potatoes, and damaged grain, and refuse rice is a utilisation of waste substances, and this has been carried further still in the employment of horse-chestnuts for the purpose.

Horse-chestnuts, which have hitherto been a waste substance, are now utilized, and by removing the bitter principle excellent starch, as well as vermicelli and macaroni, are made from them in France. The following is a plan of making flour from horse-chestnuts. Grind the horse-chestnuts and mix with the pulp carbonate of soda in the proportion of one or two per cent., and then wash the produce until it is perfectly white; 1lb. of carbonate of soda will purify 100lbs. of horse chestnuts, and produce 60lbs. of flour fit for bread, as the salt removes the bitter principle from the nut.

In Saxony great care is taken to collect the horse-chestnuts, which are regarded as a wholesome aliment for sheep, and a specific against the rot, being given to the sheep in autumn, when the green food ceases. The chestnuts are cut into pieces, and this it is dangerous to omit, as they might otherwise stick in the throat of the animal, and cause its death. Sheep as well as cattle refuse at first to eat this food; but, when accustomed to it, they seek it with avidity, and even like to eat the prickly husk in which the nut is enveloped." *

The French make good coffee out of roasted acorns, and there is yet abundance of scope for experimental research upon new roots and seeds.

Brewers' grains, the spent malt of the brewery, is used for feeding milch cows and swine.

Malt commings, the shoot of the barley after being kiln-dried, is used as a coffee adulteration, as well as by farmers for manure.

We do not cook our peas in the pod, or eat the pods, as they do in France, although they are largely fed to milch cows in the metropolis during the season; and van-loads of the pods may be seen carted away from Covent-garden to the different dairy establishments. Several hundred females are employed shelling peas in the neighbourhood of the market. The pea-shells have been recommended as a paper material, and they have been used for distilling from in France.

The waste made by the sawyer or turner, wood-dust of various kinds, has several uses. Mahogany dust is employed for smoking fish; box-dust for cleaning jewellery, being sold at 6d. per quart.

The shavings or refuse in making cedar pencils from the wood of the Virginia or American cedar, are used up to make the otto of cedar wood, a hundred weight of shavings producing about 28 ounces of the otto of cedar. Sandalwood-dust is used to fill scent sachets.

Saw-dust is extensively used for sprinkling the floors of public rooms, butchers' shops, in wine cellars for packing bottles, for stuffing dolls, and by many manufacturers; as by the needle maker, and the nail and screw maker. It is also in large demand in America for packing ice for shipment.

A large quantity of tobacco is destroyed from time to time in the customs kiln, termed the Queen's tobacco pipe, in the London Docks, and the ashes are considered a good manure. A few tons of these ashes, purchased of the Customs, are occasionally advertised for sale.

The numerous uses of seaweed, present and prospective, I can scarcely touch upon. This waste substance, to be obtained on our own and most shores in such boundless profusion, is too much neglected. An inventor proposes to make paper from it, and a French engineer speaks in raptures of it as a building material, describing it as an excellent lining for roofs and walls; among other advantages it is almost incombustible, and will not harbour vermin. We derive from seaweeds now several valuable chemical products, such as iodine; and acetic acid might be obtained from them. Their food properties I have already touched upon in the pages of the Society's *Journal*, and it is to be hoped the liberal sum offered by Sir. W. Trevelyan as a prize for the best treatise on their economic uses, will lead to a valuable fund of information.

And now for a few words on MINERAL SUBSTANCES.

Professor Crace Calvert, in a valuable paper (*Journal* vol. iii., p. 17), went into the various new or residue products of coal, exclusive of coal gas, such as first the coke, next the liquid portion, which is bought by chemical manufacturers, who obtain from it sulphate of ammonia for agricultural purposes, and salammonia for soldering, and which is also used in calico and print works for producing the style of prints called "steam goods." And from these two salts is also obtained hartshorn, extensively employed in pharmacy. Ordinary coal gas liquid is also often employed to obtain by distillation common ammonia, much used in dye works, and to produce with lichens the beautiful colouring matters called orchil and cudbear. Many hundreds of thousands of gallons of ammoniacal liquor are used in the preparation of ammoniacal alum. To obtain this and other refuse products of coal, aluminous shale comes largely into use, aud shale oil is applied as manure.

Coal tar (of which about 300,000 tons are made yearly) furnishes a chief ingredient of printers' ink, in the shape of lamp black; it is also made into asphalt for pavements, and mixed with red-hot clay, forms a charcoal that acts as a powerful disinfectant; with coal-dust it forms, by pressure, an excellent and compact artificial fuel.

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*Lasteyrie, on Spanish Sheep.

Carbolic acid possesses extraordinary antiseptic properties, and carbo-azotic acid gives magnificent straw-coloured yellow dyes on silk and woollen fabrics.

Crude naphtha, used for burning, benzine or benzole for removing grease spots, paraffine oil, extensively employed as a lubricator in the cotton mills, &c., are other commercial products, formerly waste or unapplied.

Breeze, the small dust coal of the mines, and screenings from house coals, is pressed into cakes of artificial fuel. The ashes and small cinders sifted from the ash-pits and dust-holes are used for making bricks.

Soot, again, is largely collected, and sold by the chimney-sweepers at 6d. a bushel for transmission into the country as manure.

Of argol, the sediment of wine vats and casks, we import now about 1,000 tons. When purified, it is denominated cream of tartar, and is much used by dyers as a mordant, to prepare the stuffs to receive their colours. About 1,000 tons of cream of tartar are also imported.

Glass bottles are always saleable at the bottle warehouses and the rag shops, wine and soda-water bottles fetching about 9d. to 1s. a-dozen, and doctor's bottles 3d. a-dozen. Flint glass is also a saleable article, being worked up again, and I am informed that there are from 1,000 to 1,200 tons of broken glass bought and used up annually in the few glass-works of the metropolis.

Ice is certainly a waste product, which is now, however, extensively utilized for cooling wines and other beverages, for making ice-creams, preserving fish, &c. As we get but little now-a-days from our own ponds, owing to the milder character of our winters, whenever a sharp frost does set in, the ice that forms on the water is immediately carted away to the cellars and vaults of the dealers. But it is in warm climates where ice is considered the greatest luxury, and is in most extensive demand. In the United States it has become an indispensable article of consumption, its sale having risen to an important trade, both for home use and for foreign customers. The city of Boston is the chief port of export, upwards of 1,500,000 tons being now shipped, two-thirds of which are sent to the southern cities, and the greater part of the remainder to South America and the West Indies. Some, however, is shipped to Great Britain, the East Indies, and Australia. New York consumes about 350,000 tons of ice yearly, Philadelphia, 200,000 tons; while the domestic consumption in eight other leading cities is about 250,000 tons.

"Jewellers' sweeps" is a general name for the scraps and dust remaining in silversmiths and jewellers' workshops, gold pen maufactories, &c., which are bought by persons who smelt it over again to separate the gold and silver from the refuse. Even the clothing, waistcoats, jackets, &c., of gold beaters and other workers in the precious metals are eagerly bought up for the recovery of the fragments accumulated in them, and I have heard of fabulous prices given for an old waistcoat that had been long worn by a gold beater. At any time they can readily obtain a new waistcoat for their old one.

Horse-shoe nails, kicked about the world by horses innumerable, are not the useless fragments we might naturally deem them. Gun-makers tell us that no iron is so well fitted for their purpose as that which is derived from horse-shoe nails and similar worn fragments. The nails are in the first instance made of good sound iron, and the violent concussions they receive when a horse is walking over a stony road, give a peculiar annealing and toughening to the metal, highly beneficial to its subsequent use for gun barrels.

The scrap iron from needle-making and other manufactures is also sold by cart-loads, for making gun-barrels, as it is the finest-tempered steel.

The waste metal in cutting up steel pens, at Birmingham, is returned to the Sheffield steel converter, to be worked up again, an allowance being made for it of £10 per ton, the original cost being £50 or £60 per ton.

Steel filings are sought for by the chemist to make steel wine. Barrels of brass-filings are also saved at Birmingham, fetching about half the original cost of the metal.

In the manufacture of tin-ware, there is a large waste of the raw material in the shape of clippings and pieces, and as this waste consists of the two useful metals iron and tin, attempts have been made from time to time to reclaim each metal separately, with a view to utilise them. The tin, which demands, from its great value, the highest consideration, is first separated from the iron by an acid, and afterwards, by chemical means, restored to the metallic state, but the difficulty has been hitherto to keep the restored tin quite free from iron—the presence of which, though in minute quantities, effectually neutralises the most valuable property of the tin. The great bulk of these clippings, however, is iron, which by the process of heating and melting, can be reformed into bars; and as a large proportion of the tin plates used in the manufacture of tin-ware, is composed of charcoal iron, a very fair quality of bar iron might with care be produced, but this can only be accomplished by the introduction of hammers into the furnace itself, whilst the iron clippings are hot, as from their slight substance they would not retain sufficient heat if withdrawn for the hammering process in the ordinary way.

The subject is evidently worth attention, as many hundred tons of tin clippings must be produced annually in this country, the make of tin plates exceeding 60,000 tons, and the exports having trebled in the last ten years.

There are about six or seven lbs. of tin to every 100 of clippings, so that in 100 tons of this refuse material we should obtain, say, betweeen five and six tons of tin, and perhaps 90 tons of iron. The loss from dirt is comparatively trifling, as the clippings are almost invariably quite new and clean. The clippings, I believe, are likewise used as a flux in the smelting of antimony ores.

Scrap iron, the cuttings and parings of iron work, are collected and melted again in the puddling furnaces.

Anyone visiting the docks will occasionally see barge-loads of old iron being shipped as dunnage or ballast in vessels bound for the United States or for the continent. It comprises a heterogeneous collection of all descriptions of articles, frying pans and gridirons, saucepans and candlesticks, tea-trays and boilers, shovels, and old corrugated roofing, and many are the jokes of the men who bundle in this old iron. It is the accumulated produce of the old-iron shops, the collection of the mud-larks of the rivers and other itinerants. In 1857 we exported 36,500 tons of old and broken iron, chiefly to the continent.

There is a greyish powder produced by the solution of sugar of lead in vinegar, which consists almost entirely of silver in a state of very minute division, and which, with other chemical refuse, formerly wasted, is now applied to useful purposes.

The shells from the shell banks on parts of the Chilian coast are collected by men employed for the purpose, and are purchased by the copper smelters, to burn into lime for mortar, as well probably as for a flux in their smelting operations. These shells also furnish the lime that is so much used by the Chilians for whitewashing their houses. Shell lime mixed up with ground dinas brick, and salt-water, makes a most durable kind of mortar for that climate; so firm does it set, that on knocking down an old wall, the stones will often break rather than the mortar.

These, then, are a few instances of the utilization of waste substances. They form of course but a tithe of those comprehended in so wide a subject. Some of them are amusing, many instructive, exemplifications of the profit to be derived from the collection and utilization or re-application of waste products.

DISCUSSION.

Mr. Warriner said the article seaweed, which had been alluded to, was very abundant upon our coasts, particularly on those of the west of Scotland and Ireland. After a storm from the north-west it was incredible the quantity of seaweed that was thrown up, and which probably remained until it was carried away by another storm. Some valuable and important articles of food were at present obtained from seaweed, the best known being called laver. Some kinds of seaweed formed a valuable food for cattle, and there was also a description of seaweed which he had seen in masses as large as his body, which, if reduced to a pulp, made an excellent article for the manufacture of paper. The difficulty was in getting the pulp made on the spot where the article was found, for it was liable to ferment if conveyed to a distance. If, however, it were mixed with certain proportions of glycerine, it could be sent to any part of the world without deterioration from fermentation, whilst the glycerine itself gave a glossy surface to the paper. With regard to the refuse of fish, this was scarcely used at all in this country. If the refuse of fish, which could not be preserved by dessication in Ireland, or Scotland, or Newfoundland, owing to the humidity of the atmosphere—if this were mixed with glycerine, large quantities of it could be made available for this country. The article of buttermilk had not been alluded to in the paper. In many parts of Ireland, owing to the want of proper treatment of that article, a large proportion of the buttery matter was given to the pigs. It should, however, be known, that a very small quantity of bi-carbonate of magnesia put into the milk when warm, or a little of the same substance thrown into the pail before milking, would enable five per cent. more of the buttery particles to be obtained. Another article alluded to was bones, in reference to which great extravagance generally prevailed in the domestic circle. Very few families thought it worth while to boil the bones which remained from the joints of meat; they were the perquisite of the cook, and as such found their way to the bone-dealer; but by boiling them a large amount of nutritious food could be obtained, and the bones themselves would still be serviceable as an article of commerce. The 70,000 soldiers who were upon an average in this country received rations of three-quarters of a pound of meat per day each, and of that quantity it might be calculated that one-tenth consisted of bone, a fifth part of which consisted of valuable gelatine. If that were the case, there was now a large amount of waste. During the last month he had visited upwards of 100 public institutions in London, where, in the majority of cases, copper utensils were used for cooking. In most instances an inspection of these coppers showed that the tinning had been removed, and considerable quantities of verdigris had been generated, which might be highly detrimental to health. Thus it might be said that a large number of people were daily fed with food which might almost be called poisoned, and this was caused by want of proper attention to the utensils in which it was cooked. Seeing many medical gentlemen present, he thought it his duty to mention this fact, in the hope that, in the public institutions to which he alluded, the example recently set at Christ's Hospital would be imitated, by removing the copper utensils and substituting those of metal less liable to generate substances deleterious to health.

Mr. Hyde Clarke, after making a few remarks on other subjects, said he wished Mr. Simmonds had mentioned tea seed oil, and tea seed cake, now of considerable importanee to the Darjeeling settlers, for whom he (Mr. Clarke) was agent, as well as to the other settlers in India. He observed that an account of the agency by which waste products are utilized in London, Paris, and other large cities, might be a valuable means of contributing to their further utilization. Although Mr. Simmonds had spoken of thousands of tons of animal and vegetable products treated as waste, yet in the mineral manufactures hundreds of thousands of tons were wasted, besides causing injury to human health. From the stacks and chimnies of our works enormous quantities of sulphur, arsenic, and other substances useful in the arts were sent out to be wasted, and not only these, but quantities of the common metals, and even of gold and silver. The abundance and cheapness of our fuel led our manufacturers to regard processes for economy with less attention than where fuel was dear. Thus such a process as that for applying the waste gases of the iron furnaces in smelting, had been employed for nearly twenty years in France, Belgium, and Germany, whereas it had been only lately applied in South Wales.

Mr. Campin would remark, with regard to the utilisation of leather waste, that some time since a German gentleman, with whom he was acquainted, took out a patent for the manufacture of paper from leather shavings. The plan was to remove every substance, except the gelatine, which admitted of being mixed with rags or other paper material. He was not aware, however, to what extent this process had been carried out in practice.

Dr. Lankester, F.R.S., said that each subject inintroduced in the paper would in itself form the matter for a most useful and interesting discussion; but, before they could think over one subject another of equal interest was presented, and the paper proceeded in that manner like a series of dissolving views. He had, in his own mind, fixed upon the utilisation of sewage as a subject of great importance to be discussed, but other matters had been introduced, perhaps of equal interest. He was struck with the remarks of a gentleman who preceded him upon the subject of the utilisation of seaweed, and he was glad to find that a premium had been offered through this Society for the best essay on that subject. He hoped Mr. Simmonds would be induced to employ his talents in that direction, for, with the means of research which he had at his command, he thought if it were known that he intended to take up the subject, very few would compete with him for the £100 premium that had been offered. He (Dr. Lankester) would remark that they ought to be careful how they encouraged the notion that seaweed itself was valuable as a substantive article of diet. Food prepared from that commodity did not contain nutritious or flesh-giving matter. It contained the starchy matters in considerable quantity—the heat-giving substances; but it was a mistake to suppose that these gelatinous substances were really nutritious. They could be used as additions to other descriptions of diet; and in that way alone such substances ought to be employed. There had recently been an arrival, at the South Kensington Museum, of specimens of Chinese food, including articles prepared from various kinds of seaweed, and a specimen of the description of weed used by the swallows in building their nests, which formed a well-known Chinese delicacy; but it was to be observed that these were not used as substantive articles of diet, but merely as additions to other viands, and as a table luxury. In that way only he advocated the use of gelatinous substances as articles of food. There was as much error prevalent with regard to the gelatine of bones as to that of seaweed, for there was no proof that gelatine became part and parcel of the human body. Much as they doubtless relished that savoury preparation—turtle-soup, they must not suppose that it was really a nutritious food. Milk was the great type of all food, and contained all the elements essential to life, but no gelatine was found in it, and the same might be said of the blood. Gelatine might, however, be utilized with valuable results in manufactures, but not, he thought, to any great extent as affording an article of diet. Mr. Simmonds had alluded more especially to the utilization of certain sewage products, but that was almost too wide a subject to be touched upon on the present occasion. There was a principle, however, which must always be looked to in the consideration of this subject, which was, whether the cost of the preparation was not greater than the value of the substance which was produced; and with regard to sewage it was not until they could separate the fertilising properties at a cost which would enable the farmer to use them profitably, that the utilisation of that substance would be carried out to any great extent. He believed it would never be accomplished under the present aquatic system of sewage that was now adopted in London and the other large towns; and that introduced the question—rather a startling one—whether the aquatic system ought not to be abandoned. Illustrations were not wanting to show that sewage operations could be successfully carried on upon other methods than the aquatic system. At Aldershot a different plan had been adopted, and the sewage was being utilized. It remained, therefore, to be shown that what was applicable in the case of large bodies of men in camp was not exactly applicable to large bodies of the community in cities and towns. He hardly knew whether it was right on his part to infuse any doubts into the minds of the Metropolitan Board of Works, who had been preparing for an expenditure of some millions of money in order to carry on the aquatic system of sewage upon a yet larger scale, and thus, in his opinion, to render the chances of any successful utilization of the products more and more remote. Before sitting down he wished to express his high sense of the value of the paper with which Mr. Simmonds had favoured them, from which, he believed much good would result. He would take this opportunity of suggesting that much service would be rendered to the manufacturing community if a list of such substances as were at present more or less regarded as waste, were published, as well as a list of those which were being utilized. Many manufacturers, doubtless, were unaware of the utilization of various products that were being produced in the present day, while others were equally unaware of the purposes to which those products were capable of being applied.

Mr. William Stones begged to express his thanks to Mr. Simmonds for his able illustration of the advantages to be derived from following the great example set by nature. He had, in fact, given a lucid explanation of the high command "gather up the fragments that remain, that nothing be lost." As a record of the progress which had been made in this respect, the paper needed no commendation from him. Mr. Simmonds had referred to the subject of straw-paper. The book which he held in his hand was printed upon straw paper 60 years ago, and from that time to the present, various attempts had been made to improve that manufacture, with more or less success. In 1851, a vigorous attempt was made to develope that manufacture, but great difficulty was experienced owing to the expensive nature of the chemicals employed for treating the article. This had been to a considerable extent overcome, and paper of good quality was now largely manufactured from straw. Mr. Simmonds had, however, suggested that rice-straw was a better material for the purpose. Now, wheat-straw could be bought in this country at from 25s. to 30s. per ton, with an unlimited supply, and it seemed to him rather unpromising to go to India for rice-straw. Reckoning that the same quantity of material would be required as in the case of wheat-straw, namely three tons of straw for one ton of paper, it might be a grave question whether that article could be employed to advantage commercially. If the whole of the paper manufactured in this country were to be made of straw, it would not consume more than one-tenth of the straw annually produced. The same remark would apply to the fibre of the sugar-cane for paper-making purposes—namely, the cost of freight. With reference to the other fibrous materials available for the purpose, he would state that, at the time when the late Dr. Forbes Royle read his paper upon fibrous plants, he (Mr. Stones) took the list of those fibres to a colonial broker, who informed him that they were worth in the market, for rope and other manufactures, double the price that the best rags were fetching; consequently, he inferred that a large introduction of those materials would affect the hemp and flax market rather than that of paper material. Couch grass, or twitch, had been mentioned as a substance applicable to paper manufacture, but he thought the price spoken of, viz., 10s. to 12s. per ton, would hardly pay for the collecting. From £20,000 to £30,000 had been expended in the endeavour to work up this material, but as it did not answer, the establishment was now engaged in working the ordinary paper materials. Mr. Simmonds had alluded to the circumstance that the small quantity of paper exported from this country was owing to the deficiency of material for the manufacture of low-priced papers. But there was another thing to be considered, that was the almost prohibitory duty which was levied upon paper in many countries. In Canada, our own colony, there was a duty of 12 per cent.; in the United States the duty, which was formerly 30 per cent., was now reduced to 24 per cent.; whilst in France there was a duty of 1s. per pound, or 200 per cent.; and yet to each and all of these places the English managed to send paper. So much valuable time and money had been wasted by ingenious persons since the premium for a new material for paper was advertised in the *Times*, that he felt called upon to caution those who were disposed to follow out the suggestion, that a great many articles had been tried and found wanting in a commercial point of view.

Mr. Battley mentioned that leather cuttings had been utilised in the manufacture of Prussian blue, whilst a great deal of the same description of refuse was employed in white lead works. Another application he could mention, as coming within his own experience, was in manufacturing from the better description of leather cuttings an inner sole for boots and shoes, which rendered those articles more comfortable to the wearer, and, at the same time, protected the foot from wet if the outer sole became worn away.

Mr. Varley said in three instances in particular, in which the utilisation of waste substances had been pointed out by Mr. Simmonds, he was induced to think that this utilisation was not legitimate. The first was in the case of re-working up woollen fabrics, the result of which was to destroy the fibre of the wool. Hence it was that when he purchased new stockings made partly of old wool mixed with a small quantity of new material, he found his feet went through them. The second case was that of glue, which was now made of very inferior quality, from the circumstance that every substance containing a particle of gelatine was forced into the service. Formerly glue was made of so good a quality that its adhesive powers were stronger than the fibre of the wood which it cemented together, and the wood would fracture before the glue, but this was not the case now. The third instance was in the case of paper, which, under the so-called system of utilisation, was worked up time after time, until it was reproduced in the shape of a worthless commodity for any purposes of durability; and hence a drawing which was worth a hundred guineas was sometimes placed on a piece of paper which had no lasting qualities.

Mr. F. B. Houghton was proceeding to read a paper descriptive of his process for converting flax refuse into half-stuff for paper-makers, but was stopped by the Chairman, as out of order in so doing. The paper was handed to the Secretary, and the process appears to be as follows:—

The flax refuse is boiled in an alkaline solution at 380° Fahrenheit, and, after being subject to the process for about three hours, is converted into excellent half-stuff, free from all trace of silica. The refuse employed is not merely that of the mills, but includes that which, having been threshed for the seed, is valueless for the manufacture of linen, and is generally thrown away. Thus at length, he considers, is overcome the difficulty of obtaining a raw, material cheaper and more plentiful than rags, and which, not being the remains of something that has already been used, can be profitably produced for the purpose of making paper.

It appears from Mr. Houghton's statement, that flax, straw, and flax refuse may be purchased for a few shillings per ton, and by this inexpensive process may be reduced into pulp, equal in quality to that produced from the best linen rags, which cannot be purchased under £28 to £30 per ton. The largest boiler he has at present in use, is one capable of containing about 3cwt. of raw material, from which 1½cwt. of half-stuff may be produced. The whole operation occupies about four hours. Difficulty was at first experienced in getting rid of the small particles of unreduced matter so constantly seen in ordinary straw paper, but this is an obstacle that Mr. Houghton states he has entirely overcome.

Mr. G. F. Wilson, F.R.S., said the recovery of grease from the soap waters of the woollen manufacturers, alluded to by Mr. Simmonds, though only recently very prominently talked about, had been for some years carried on in this country on a very large scale, and some millowners were now in the habit of extracting the grease for themselves. This manufacture afforded an instance of how waste products often required two distinct inventions before they were utilized. Macartan, in the specification of his patent of 1837, described a good practical process for separating the grease from the waters of the woollen mills; but it was not till some years afterwards that the introduction of the practical distillation of fatty bodies gave the power of purifying such grease sufficiently to make it worth collecting. The glue refuse, mentioned in the next paragraph, had a use besides that as manure, a grease being extracted from it, and some of the finest specimens of stearic acid in the Exhibition of 1851 had been made from this offensive material. He could confirm Mr. Simmonds's opinion of the value of the palm kernel oil trade; this kernel oil was now extracted largely, not only in Africa, but from imported nuts in this country; and that this was not done long ago was not the fault of the manufacturers here, as they frequently called attention to the large quantity of waste nuts, and the valuable oil they contained. This oil, when carefully prepared so as to keep its white colour, was worth more than the red oil of the pulp surrounding the nut, to obtain which the palm fruit was formerly exclusively collected. As confirming the Melbourne discovery of the dye extract from "B. flats," he might mention, that when lately picking off some brown aphides from peach buds, his fingers were dyed a bright brown where the insects had been squeezed. One of the waste products mentioned, glycerine, had been spoken of as a preservative of fish, and it might be useful in small quantities to cure fish for food; but his experience of its use in large quantities upon a large red lake trout which, by immediate coating with glycerine, he was enabled to bring from Scotland to London so unchanged as to preserve even the beautiful fugitive colour of the scales, went to show that immersion in concentrated glycerine, at least, would, by extracting its flavour, render fish so treated worthless as food. Dr. Lankester, when suggesting the publication of a list of waste substances wanting uses, perhaps, at the moment, forgot the long catalogue published in the last premium list issued by the Society.

Mr. Hilton begged to mention, in connection with this subject, that a friend of his had taken out a patent for the utilisation of wolfram; which was no sooner done than the parties who had the supply of that material, raised the price of it considerably; that had been the case in several instances with which he was acquainted, in which patentees had attempted to utilise waste products, and the moment they did so, a combination was entered into by the holders of the article, and the price of it was raised accordingly. Mr. Hyde Clarke, in his remarks upon the utilisation of the gases from smelting furnaces, &c., had placed sulphur at a low scale of value, with which he (Mr. Hilton) did not agree. When there was a prospect of war with Naples, sulphur rose rapidly in price, and it formed a principal element in the manufacture of that important article sulphuric acid.

The Chairman said the time having now arrived when it was his duty to ask the meeting to accord their thanks to Mr. Simmonds, for his very able and interesting paper, he might be permitted to offer one or two brief remarks upon this subject. In the first place he would say that the title of the paper was hardly appropriate to the subjects treated of. He thought it should have been "the utilisation of substances which have been in times past waste substances." There were several of these substances to which allusion had been made. In the first place, there was the sewage manure. He agreed with Dr. Lankester, that in the large towns where so much water was used, they could not do much in the way of utilising the sewage; but in passing through the country districts, they must have been struck with the amazing quantity of animal and vegetable matter that was wasted in every farm-yard. He believed all they had to do was to direct attention to these facts, which was best done in such papers as this, as they were very widely circulated by means of the *Journal*, and without it they would be unknown beyond the limits of that room. Then, again, as to coal. At present many of the products of coal were wasted, and this they must look to the chemist to remedy. One great fact connected with the use of coal was the bad construction both of furnaces and private fire-places; waste was thereby promoted in every possible form, as was best shown by the immense volumes of smoke that filled the atmosphere of every large city. Then, again, there was another formerly waste product which was now utilised, and from which articles of great commercial importance were derived. One portion of refuse from the manufacture of soap was iodine; another was glycerine; and there were other equally important products both in the soap and candle manufacture. They had been told by one speaker that they were retrograding in one or two points in attempting to utilise these waste substances. He had complained that on putting on a new pair of woollen stockings for the first time his foot went through them. He was afraid the answer to that was to be found in the place at which the articles were bought, and the price paid for them. If persons would have cheap commodities when they were unable to judge whether they were cheap and good or cheap and bad, they must be content to pay the penalty. The same argument applied to glue and to paper. If good qualities of those articles were required, he believed they were always to be obtained by paying a proper price for them. He would now call upon the meeting to pass a vote of thanks to Mr. Simmonds, and he would express a hope that, on a future occasion, he would find an opportunity of treating one or two of the more important subjects introduced that evening in a more detailed manner.

The vote of thanks having been passed,

Mr. Simmonds in acknowledging the compliment, said in justice to himself he must state that owing to the extent of the subject, he had been compelled to omit in the reading of the paper, matters which would be found more in detail in it when published in the *Journal*. With regard to the title of the paper, he admitted its inappropriateness, but the difficulty was to select a proper one. It had been argued by one speaker that he had introduced articles which could not be made use of, owing to their bulk and the cost of transmission to this country; but he had thrown out the suggestion that such material might be imported in the shape of half-stuff, and not as entirely raw material. He had not gone into the question of adulteration or sophistication; that was not a matter with which it was his province to deal. It was for buyers and those interested to look out for the protection of their own interests. If people would purchase cheap things, they must take the consequences.

The Paper was fully illustrated by curious and interesting specimens of all the leading articles referred to, from Mr. Simmonds's private collection. Mr. C. Nightingale also contributed illustrations of flocks for stuffing and other applications of waste wools, and the refuse feather dust from the drying mill, used as manure; Mr. S. Mahood sent some elegant fish-scale ornaments; Mr. M. C. Cooke, paper made of various materials; Messrs. G. Thomas and Son, flock and flock papers; and Mr. J. B. Balcombe, Secretary of the Agricultural Chemical Company, samples of their new patent fish manure.

The Secretary announced that the Paper for Wednesday evening next, the 16th instant, would be "On the Society of Arts Union of Institutes, and the Examinations connected therewith," by Mr. Harry Chester, Vice-President, late Assistant-Secretary to the Committee of Privy Council on Education. On this evening the Lord Bishop of London, President of the Crosby-hall Evening Classes, will preside.

The following letter has been received by the Secretary since the meeting:—

Sir,—With reference to the subject of Mr. Simmonds's paper, I have seen with regret that the gardeners and horticulturists waste their flowers, which by a proper application of known principles could be economised. Flowering plants are cultivated, but they do not always find a market. Now, it is a real waste not to utilise the blossoms which

> "Waste their fragrance in the desert air."

It is not in England alone that this occurs, but in her colonies. In Jamaica, in St. Helena, and many other places, orange blossoms and jasmin flowers are in abundance, but no effort is made to save or economise their fragrance, although the ottos procurable from them are nearly as valuable as gold, weight for weight, and for these England pays pretty dearly to France and Italy. There is a steady and regularly increasing demand for the odorous principle of flowers by the perfumery factors of England. Why then do not some of the British colonies supply this demand?

Passing to another waste substance, I think the English farmers cannot be aware of what an excellent guano there is to be had for nothing at the port of London. When the tide is down, there is found a rich deposit on the banks of the Thames, which no one seems to take an interest in, except "the mud-larks." If a few of the farmers would charter a canal boat and fetch this mud—which offends both Lords and Commons—they would find that they could procure a manure, equal in monetary value to £5 per ton, for 30s. The numerous canals, and even the river itself, are good "highways" for carrying this to the corn fields, and London would be glad to pay something to remove it, as it does now in the "rate for cleansing and sweeping."

The most important subject, however, which can be discussed relating to waste is that of waste lands within a short distance of this metropolis, for although an Act of Parliament is especially necessary for its inhabitants to obtain only one hundred superficial feet of space out of its back windows, there are hundreds of acres of waste land near it, of which no use is made. That this land—bearing the familiar names of Putney Heath, Boxmoor, Chobham, Aldershot, &c.—should not be "utilized," does appear a paradox to the proverbial industry and economy of Great Britain; and the sooner these "wastes" are made useful the happier will her children be.

I am, &c.,
SEPTIMUS PIESSE.

Bond-street, W.

THE NATIONAL GALLERY AND THE ROYAL ACADEMY.

The Chancellor of the Exchequer informed the House of Commons on Tuesday evening, that an arrangement had been come to between the Government and the Royal Academy, to the effect that the latter body would give up to the Government the portion of the National Gallery hitherto occupied by the Academy, the Government furnishing them with a site on the grounds at Burlington House, on which the Academy would out of their own funds erect a suitable building for themselves. The whole of the National Gallery will then become available for the national pictures; and fitting accommodation will be there found for the Vernon and Turner Galleries. In the meantime, until the new building for the Royal Academy is completed, which it is expected will take about two years, the Vernon and Turner collection will be placed in a temporary building, to be erected on that portion of the Royal Commissioners' land, at Kensington, which is now leased to the Government.

INDUS STEAM FLOTILLA.

The first vessel of a series which is destined and expressly constructed for the river traffic of the Indus, between Hyderabad and Mooltan, was tried down the river on Monday last, the 7th instant, in the presence of a numerous party of scientific gentlemen and some of the directors of the Scinde and Punjaub Railways, to whose enterprise it is due that steamers really fitted for Indian river navigation are at length being adopted.

The difficulties which have hitherto lain in the way of keeping up continuous communication along the waterways of the Indian empire during the dry season, have been chiefly, if not entirely, mechanical ones. Steamboats for such service, indeed, require the most perfect reconcilement of what at first sight appear to be almost impossible conditions, such as great power, high speed, and ample stowage for cargo, with less that two feet draught of water. The directors, therefore, of the new flotilla company wanted a vessel combining in the best way it could, the many opposite qualities required for the navigation of the river. The engineer of the company, Mr. Yarrow, being aware of the peculiar nature of the difficulties to be overcome, and having obtained all the information which the limited experience of the Indus navigation would yield, decided that it was necessary that the steam flotilla for such a traffic should be composed of vessels able to pass all bars and shallows by only drawing two feet of water, and that they must further have a speed of twelve miles an hour; be 200 feet long and 38 feet wide, in order to convey the goods and passengers, and, above all, that they must be of sufficient power to be able to tow barges and river-boats up the stream with them. Plans and specifications of the requisites were accordingly prepared, and the company invited the competition of engineers and ship-builders. Of all the designs sent in, Mr. Scott Russell's was selected, and he was accordingly directed to construct the first vessel of the flotilla, to test by experience how far the mechanical difficulties in its structure could be overcome. This vessel was, on Monday, for the first time, tried down the Thames, and the result of the trip was in the highest degree satisfactory, surpassing even the expectations which had been formed as to speed, power, &c. The boat, in appearance, is very like the American river-steamers—flat-bottomed, square-shaped, and with a deck-house which almost covers the entire vessel. Her length over all is 220 feet, breadth 38, draught of water 1 foot 10 inches. As a passenger boat, and with average cargo, her speed is equal to a little over 13 miles an hour, and with boats containing 500 tons cargo in tow, it is confidently reported that she can be depended on to average eight miles an hour on the Indus. The hull is constructed in a peculiar manner, in order to carry the weight, and sustain the propelling power of large machinery.

Two longitudinal wrought-iron girders run the whole length of the vessel, rising some feet above the deck, so as to form the walls of the deck cabins. The girders form the main strength of the hull, and are applied in a manner specially designed by Mr. Scott Russell, and which he has already employed in the construction of the Great Eastern and other vessels where great strength and great length are necessary. The engines of the vessel are, nominally, of 120-horse power, but capable of working up to 600 indicated horse power. They are three-cylinder oscillating engines, the merit of them being due to Mr. Scott Russell, and they bid fair to come into very general use, whether for paddle or screw engines.

During the whole of the trial, though these engines sometimes exerted their full power against a head-wind and strong tide, they worked with the most perfect ease, and with very little of that vibration generally produced in vessels of large power and light draught of water. Mr. Scott Russell undertook that the draught of water, when laden with passengers, and an average cargo of 350 tons, should not exceed two feet. On Monday, however, her draught was, aft one foot ten inches, and forward scarcely twenty inches.

The satisfactory nature of the principles on which she has been constructed was considered as conclusively proved, and a greater thickness and strength of hull will be allowed to the other vessels of the flotilla, which will shortly be constructed and despatched to India as soon as finished.

Home Correspondence.

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ELECTRO-ZINC DEPOSITS ON ENGRAVED COPPER PLATES.

SIR,—Your last number contains a letter from Mr. Henry Bradbury, describing a process for covering an engraved copper-plate with a deposit of zinc, in order to protect it from wear while being printed, and it is stated such a deposit will yield from 1,500 to 2,000 impressions.

This is an imitation of the process for covering engraved copper-plates with iron before sending them to press, originally introduced in Paris under the name of "Acierage," for which I hold an English patent, taken out last year, and which process I had the honour of describing before a full meeting of the Society of Arts, in a paper read on the 24th of November last.

It is a well-known fact that zinc, in a pure state, is even softer than copper, and, moreover, it has a natural tendency to retain the printing ink instead of giving it off freely, as steel and its basis, iron, will do. Every printer who has had zinc plates to work from can testify to the very limited number of good impressions which are obtainable from zinc plates, sometimes used for maps, plans, &c.; whereas the metal I use, as described in the specifications of my patent, is capable of yielding 10,000 impressions and upwards before the first coating shows signs of wear. This was exemplified at the last meeting of the Graphic Society, where I exhibited several engraved copper plates, forming part of a work shortly to be published, some of which had already produced 10,000 impressions, and this with one coating, without any perceptible difference between the first and the last impressions which I had sent with the plates.

Such a result will, I hope, establish in a satisfactory manner the superiority of the one metal over the other; for zinc cannot by any possibility compete with the harder metal—iron, which seems to acquire, by being deposited through galvanic agency, a power of cohesion and resistance much beyond that which pure iron possesses, and very nearly equal, for printing purposes, to the best steel used in the trade for making steel plates.

I am, &c.,
F. JOUBERT.

Porchester-terrace, Feb. 10, 1859.

MEETINGS FOR THE ENSUING WEEK.

MON. ......London Inst., 7. Rev. Henry Christmas, "On Shakespeare's Historical Dramas."
Medical, 8.
Geographical, 8½. I. Mr. J. W. Taylor, "On the Aurora Borealis in Greenland." II. "Discovery by Capt. Palliser and Dr. Hector of Practicable Passes through the Rocky Mountains, within the British Possessions, &c.," communicated by the Right Hon. Sir E. B. Lytton, H.M. Sec. for the Colonies.
TUES. ......Royal Inst. 3. Professor Owen, "On Fossil Mammals."
Statistical, 8.
Pathological, 8.
Civil Engineers, 8. Discussion on Mr. Jameson's Paper "On the Performances of the screw steam-ship *Sahel*, fitted with Du Tremblay's Combined Vapour Engine, and of the sister-ship *Oasis*, with Steam Engines worked expansively, and provided with Partial Surface Condensation."
WED. ......United Service Inst., 3. Mr. F. A. Abel, "On Gunpowder: its Nature and Effects as compared with those of other Explosive Bodies, its Composition and Decomposition."
London Inst., 7. Conversazione.
Royal Soc. Lit., 4½.
Society of Arts, 8. Mr. Harry Chester, "On the Society of Arts' Union of Institutions, and the Examinations connected therewith."
Microscopical, 8. Anniversary.
Entomological, 8½.
THURS. ...Royal Inst., 3. Prof. Tyndall, "On the Force of Gravity."
Royal Soc. Club, 6.
Antiquaries, 8.
Linnean, 8. I. Professor Huxley, "On the Structure of the Integument in the *Crocodilia*." II. Mr. Macdonald, "On the Anatomical Characters of a remarkable form of Compound *Tunicata*." III. Mr. Macdonald, "On the Anatomical Characters of an Australian species of *Perophora*." IV. Mr. Walker, "On *Heterocerous Lepidoptera*," collected by Mr. Wallace at Singapore.
Chemical, 8.
Royal, 8½.
FRI..........Geological, 1. Annual General Meeting.
United Service Inst., 3. Rev. Dr. Wolff, "On the Spirit of Mohamedanism and Mohamedans in Egypt, Arabia, Persia, Bokhara, and Affghanistan, with reference to the present War in India."
Royal Inst., 8½. Dr. S. Scott Alison, "On Certain Auditory Phenomena."
SAT. ......Asiatic, 2.
London Inst., 3. Mr. Thomas A. Malone, "On the Metallic Elements, and their Principal Salts and Alloys."
Royal Inst., 3. Dr. W. A. Miller, "On Organic Chemistry."

PARLIAMENTARY REPORTS.

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SESSIONAL PRINTED PAPERS.

PAR. No.

Delivered during the Vacation 1858.

415. Colonization and Settlement (India)—3rd Report.
479. Quartermasters—Copy of Memorial, &c.
485. Colonels—Return.
493. Gold and Silver Watch Cases—Return.
494. East India—Return.
502. Suspended Canonries—Return.
466. Revenue (Ireland) Accounts.
482. Consular Service and Appointments—Report.
526. Skerries Harbour—Return (a corrected Copy).
444. Public Establishments (Exemption from Rates)—Report.
475. Kafir War—Account.
496: Curragh and Aldershot Camps.—Return.
503. Fines and Penalties (Ireland)—Abstract of Accounts.
514. Municipal Boroughs (Ireland)—Abstract of Statement.
476. Standing Orders of the House of Commons.
504. National Gallery—Correspondence.
71 (1). East India (Missionaries), East India (Idolatry)—Return.
462. Sugar, &c.—Return.
470. Fines and Penalties (Ireland)—Return.
98 (A v). Poor Rates and Population—Return (A).

PATENT LAW AMENDMENT ACT.

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APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, February* 4, 1859.]

Dated 2nd November, 1858.

2438. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—An improved system of railway brakes. (A com.)

Dated 1st December, 1858.

2740. R. Laming, Hayward's-heath, Sussex—Imp. in purifying gas, and in turning sulphuretted hydrogen, carbonic acid, and ammonia, or their compounds, to profitable account.

Dated 27th December, 1858.

2962. F. W. Turner, Foxhole Colliery, Swansea—Imp. in steam engines, condensers, and steam boilers, and in promoting combustion in the furnaces of the same.

Dated 28th December, 1858.

2968. A. Lyons, Finsbury—Imp. in travelling bags.

Dated 1st January, 1859.

8. J. Walkland, Green-lane, Sheffield—An apparatus for lighting cigars and tobacco.

18. I. Wood, Charing-cross—Imp. in cutting and finishing corks, and in machinery used for such purposes. (A com.)

Dated 13th January, 1859.

106. W. Bennetts, Tuckingmill, Cornwall—Imp. in mechanism used for preventing accidents when raising or lowering skips, baskets, or apparatus, particularly applicable to mines.

117. W. Wilson, Newcastle-on-Tyne—Imp. in machinery for felting bodies of hats and bonnets. (A com.)

Dated 15th January, 1859.

128. J. Eccles, Blackburn, Lancashire—Imp. in the manufacture of articles from clay earths for building purposes, as substitutes for such articles as are usually formed of stone and other materials.

130. P. A. Viette, 25, Faubourg de Schaerbeck, near Brussels—Certain inks applicable for engraving and lithographic purposes.

132. R. Mushet, Coleford, Gloucestershire—Imp. in the manufacture of cast steel.

134. R. Mushet, Coleford, Gloucestershire—An imp. or imps. in the manufacture of cast steel.

Dated 17th January, 1859.

136. T. Edwards, Liverpool—Imp. applicable to letter boxes and other like receptacles.

138. E. T. Hughes, 123, Chancery-lane—Imp. in machinery or apparatus for sowing seed. (A com.)

140. S. T. Cooper, Upper Clapton—Imp. in the use and application of artificial light.

142. E. Brooks, 43, Edward-street, Dorset-square—Imp. in locks.

144. G. Collier and J. Collier, Halifax—Imp. in means or apparatus for washing and drying wool and other fibres, part of which improvements is also applicable for other purposes, where steam, hot air, or other fluids are required to be conveyed under pressure through moveable connections.

Dated 18th January, 1859.

146. J. Luis, 1B, Welbeck-street, Cavendish-square—A new machine for putting on, equalizing, and drying the colours on paper for hangings, book-binding, boarding, and fancy paper of every description. (A com.)

147. W. Newman, Aston, near Birmingham—New or improved furniture for window and other blinds.

148. J. Foster, Lancaster—Certain imp. in machinery or apparatus called "spinning frames" and "roving frames" employed for spinning and roving flax, tow, hemp, jute, and other fibrous substances.

149. G. Hamilton, Liverpool—Imp. in treating rosin and resinous substances to obtain products therefrom, and in treating the products obtained from rosin and resinous substances.

150. H. Gallon, J. H. Bean, and S. Lumb, Leeds—Imp. in machinery for slotting, morticeing, tenoning, and cutting wood, iron, and other substances.

151. C. D. Archibald, Rusland-hall, Lancashire—Generating force. (A com.)

152. R. A. Brooman, 166, Fleet-street—An improved silk thread, and a new fabric made entirely or partially from the same. (A com.)

153. R. Garrett, jun., and J. Kerridge, Leiston Works, Saxmundham, Suffolk—An improved arrangement of combined thrashing and dressing machine.

154. J. Fawcett, Kingston-upon-Hull—An improved preparation of food for cattle and horses.

155. R. Bradley and W. Craven, Westgate Common Foundry, Wakefield—Imp. in machinery or apparatus for manufacturing bricks, tiles, and other similar articles.

156. W. Trotter, South Acomb, Northumberland—Imp. in reaping machines.

157. J. H. Johnson, 27, Lincoln's-inn-fields—Imp. in air pistols and guns. (A com.)

Dated 19th January, 1859.

159. W. A. F. Powell, Bristol—Imp. in stopping or closing jars and bottles.

161. T. Clarke, Litchurch-lane, near Derby—Imp. in the manufacture of core barrels for piles or columns used either for railway piles or columns, or for water pipes, or sewerage pipes.

162. E. T. Hughes, 123, Chancery-lane—Imp. in machinery or apparatus for measuring and sorting silk and other textile materials. (A com.)

163. J. Whitehead, Halifax—Imp. in the means or machinery for the manufacture of purled wire.

164. E. Stevens, 5, Patriot-row, Cambridge-road—An improved cooking utensil.

165. T. A. Evans, 15, Queen's-road, Bayswater, and W. J. H. Rodd, 38, Arlington-square, Islington—A new method of advertising.

166. W. Poupard, Blackfriars-road—An improved wheel-skid or shoe.

167. J. H. Johnson, 47, Lincoln's-inn-fields—Certain imp. in the manufacture or production of lasts, boot-trees, and clogs, and in the machinery and apparatus employed in the production of such articles. (A com.)

Dated 20th January, 1859.

170. J. C. Reid and W. Milner, Liverpool—Certain imp. in the construction of ships and vessels.

171. H. Hilliard and T. Chapman, Glasgow—Imp. in table knives, and in table-knife sharpeners.

172. A. Lindo, Batignolles, France—Imp. in manufacturing soap.

173. W. Woofe, Gloucester—Imp. in implements for ploughing, tilling, and paring land.

174. E. T. Hughes, 123, Chancery-lane—Imp. for preventing incrustation in steam boilers or other vessels.

176. S. Phillips, Moseley, Worcestershire—Imp. in sliding sashes, shutters, or doors.

177. W. E. Newton, 66, Chancery-lane—Improved apparatus for measuring water and other liquids. (A com.)

178. T. Greenwood, J. Batley, and J. Dockray, Leeds—Improved machinery for converting hemp and flax fibres into yarn, twine, ropes, and cordage.

179. J. Bent, Newhall-street, Birmingham—Certain imp. in clasps or fastenings applicable for belts, garters, and other purposes.

180. J. Shanks, Arbroath, N.B.—Imp. in mowing machines.

181. J. L. Clark, Haverstock-hill, and J. Muirhead, Gloucester-road, Regent's-park—Imp. in electric telegraphs, and in the apparatus used in working the same.

182. H. Sagar, Broughton, near Manchester, and A. Schultz, Paris—Imp. in producing pink shades on cotton fabrics or yarns.

Dated 21st January, 1859.

183. T. Richardson, 20, New Bridge-street, Newcastle-on-Tyne—Imp. in the manufacture of manure.

184. S. Osler, Great Yarmouth, Norfolk, and J. B. Balcombe, Brixton, Surrey—Imp. in apparatus for treating fish, so as to adapt it for manure, and in using the same alone or in combination with superphosphate of lime or other phosphates.

185. L. Le Prince, 261, Regent-street—The imp. of ladies' boots and shoes, called the cameleon boot and the cameleon shoe.

186. G. B. Harkes, 1, Montague-terrace, Trinity-square, Southwark—An improved machine for washing, wringing, and mangling.

187. G. Ellis, 4, Collier-street, Pentonville—The imp. of muffs, to be called the patent reticule muff.

188. J. Hick and W. Hargreaves, Bolton-le-Moors, Lancashire—Imp. in the construction of steam boilers.

189. R. Howell, Smethwick, Staffordshire, and R. J. Willder, Birmingham—An imp. or imps. in taps or stop cocks.

191. W. Wells, Greenland, near Halifax—Imp. in machinery or apparatus employed in spinning and twisting cotton, and other fibrous substances.

192. A. Davenport, Birmingham—An improved regulating burner for gas. (A com.)

193. J. Childs, Windsor-house, Windsor-road, Putney—An imp. in applying heat in the manufacture of artificial gums and teeth, and other articles composed of india-rubber, or gutta-percha, combined with sulphur.

194. J. H. Hume, Broughty Ferry, Forfar, N.B.—Imp. in warming apparatus for the feet.

195. A. J. A. Gautier, J. G. Dumay, and J. T. Persin, Paris—An improved manure.

197. J. Newman, Birmingham—Imp. in the manufacture of chains.

198. B. Lauth, Surrey-street, Westminster—An improved mode of, and improved machinery for, rolling plates, bars, rods, and shafts.

199. J. Edwards, 77, Aldermanbury—Imp. in the manufacture of buckles.

Dated 22nd January, 1859.

201. D. Moseley, Chapel Field Works, Ardwick, Manchester—Imp. in the manufacture of india-rubber thread.

203. E. Dorsett, 76, Old Broad-street, London, and J. B. Blythe, Minerva-place, New-cross, Kent—Imp. in the distillation of oil from coal tar, and in apparatus for preserving timber therewith.

205. W. E. Newton, 66, Chancery-lane—Improved machinery for cutting files. (A com.)

237. C. Sharps, Philadelphia, Pennsylvania, U.S.—Imp. in breech-loading repeating fire arms.

WEEKLY LIST OF PATENTS SEALED.

[*From Gazette, Feb.* 4, 1859.]

February 4th.

1781. E. Leigh.
1788. A. V. Newton.
1791. G. H. Bovill.
1797. J. Walker.
1804. J. Walker.
1818. A. Barchou.
1821. F. Haeck.
1835. J. H. M. Maissiat.
1864. L. A. Forot.
1958. F. Massey.
2195. H. Monier.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, Feb.* 4, 1858.]

January 31st.

273. E. Schischkar.
279. A. Lamb and J. Ronalds.
419. C. S. Jackson.